

## SECTION 16510

### INTERIOR LIGHTING SYSTEM

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**NOTE: Edit this Section to match project requirements.**

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#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

Furnish and install the following:

1. Interior lighting fixtures and accessories.
2. Lamps.
3. Ballasts.

##### 1.2 DEFINITIONS:

- A. Fixture: A fixture is a complete lighting unit including lamp(s) and parts required to distribute the light, position and protect the lamp(s), and connect the lamp(s) to the power supply.
- B. Luminaire: The same as "fixture".
- C. Average Life: The time after which 50 percent will have failed and 50 percent will have survived under specified ambient conditions.
- D. Listed/Labelled: As defined in ANSI/NFPA 70*National Electrical Code*.

##### 1.3 SUBMITTALS

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**NOTE: Edit to match project requirements.**

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- A. Submit the following in accordance with the requirements of Sections 01300 and 01700.
- B. Catalog Data: Submit catalog data describing lighting fixtures, lamps and ballasts. Include data substantiating that materials comply with specified requirements. Arrange data for fixtures in the order of fixture designation.
- C. Performance Curves/Data:
  1. Submit certified photometric data for each type of lighting fixture.
  2. Submit supply air, return air, heat removal and sound performance data for air handling fixtures.
- D. Shop Drawings: Submit manufacturer's shop drawings for non-standard fixtures.
- E. Submit warranty for electronic ballasts.
- F. Maintenance Data: Submit maintenance instructions for inclusion in the operating and maintenance manuals.

#### 1.4 ENVIRONMENTAL REQUIREMENTS

Provide lighting fixtures, lamps and ballasts, suitable for operation at an altitude of 7500 feet above sea level.

#### 1.5 SPARE MATERIALS

- A. Furnish the following extra materials matching products installed. Package with protective covering for storage and identify with labels describing contents.
- B. Fluorescent Lamps: Provide 5 percent of quantity of lamps of each type, but no fewer than two lamps of each type.
- C. Incandescent Lamps: Provide 10 percent of quantity of lamps of each type, but no fewer than two lamps of each type.
- D. High Intensity Discharge (HID) Lamps: Provide 5 percent of quantity of lamps of each type, but no fewer than two lamps of each type.
- E. Lenses and Louvers: Provide 1 percent of quantity of plastic louvers and lenses of each type, but not fewer than one of each type.
- F. Ballasts: Provide 1 percent of quantity of ballasts of each type, but not fewer than one of each type.

#### 1.6 QUALITY ASSURANCE

- A. Comply with ANSI/NFPA 70 *National Electrical Code* for components and installation.
- B. Provide fixtures that are UL listed and labelled for their indicated use and location on this project.
- C. Use manufacturers that are experienced in manufacturing fixtures, lamps and ballasts similar to those indicated for this Project and have a record of successful in-service performance.
- D. Coordinate fixtures, mounting hardware and trim with the ceiling system.

#### 1.7 WARRANTY

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**NOTE: Edit 1.7 to match project requirements. Warranty information needed only for electronic ballasts.**

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Electronic Ballasts: Submit a warranty, mutually executed by the ballast manufacturer and the installer, agreeing to replace electronic ballasts that fail in materials or workmanship with **five** years, beginning on the date of substantial completion. This warranty is in addition to, and not a limitation of, other rights and remedies the University may have under the Contract Documents.

### PART 2 PRODUCTS

#### 2.1 INTERIOR FIXTURES

- A. Furnish interior lighting fixtures that comply with requirements specified below and the lighting fixture schedule on the Drawings.

- B. Furnish metal parts free from burrs and sharp corners and edges.
- C. Furnish metal components that are formed and supported to prevent sagging and warping.
- D. Furnish steel parts that are finished with manufacturer's standard finish applied over a corrosion-resistant primer. Reject fixtures with finish having runs, streaks, stains, holidays or defects. Replace fixtures showing evidence of corrosion during warranty period.
- E. Provide doors and frames that are smooth operating and free from light leakage under operating conditions. Relamping shall be possible without the use of tools. Doors, frames, lenses and diffusers shall be designed to prevent accidental falling during relamping and when secured in the operating position.
- F. Provide fixtures with minimum reflecting surface reflectance as follows unless scheduled otherwise:
  - 1. White Surfaces: 85 percent
  - 2. Specular Surfaces: 83 percent
  - 3. Diffusing Specular Surfaces: 75 percent
- G. Provide lenses, diffusers, covers and globes that are 100 percent virgin acrylic unless scheduled otherwise. Provide minimum 0.125 inches lens thickness. Provide injection molded lenses for fluorescent troffers.

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**NOTE: Edit the following five paragraphs to match project requirements.**

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- H. Provide fluorescent fixtures that conform to UL 1570 *-Fluorescent Lighting Fixtures*.
- I. Provide high intensity discharge (HID) fixtures that conform to UL 1572 *High Intensity Discharge Lighting Fixtures*.
- J. Provide incandescent fixtures that conform to UL 1571 *Incandescent Lighting Fixtures*.
- K. Provide track lighting systems that conform to UL 1574 *Track Lighting Systems*. Provide all components from the same manufacturer.
- L. Provide fixtures for hazardous locations that conform to UL 844 *Electric Lighting Fixtures for Use in Hazardous (classified) Locations*.

## 2.2 LAMPS

- A. Furnish lamps that comply with requirements specified below and the lighting fixture schedule on the Drawings.
- B. Furnish lamps that conform to ANSI Standards, C78 series applicable to each type of lamp.
- C. For fluorescent general lighting in interior spaces furnish energy-efficient T-8 lamps with 3500°K color temperature and a color rendering index of at least 70.

- D. For HID general lighting in interior spaces furnish improved color quality high pressure sodium lamps with 2200°K color temperature and color rendering index of at least 65.
- E. Manufacturers: General Electric, North American Phillips, Sylvania

## 2.3 FLUORESCENT LAMP BALLASTS

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**NOTE: Edit 2.3 to match project requirements.**

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- A. Provide energy-saving fluorescent ballasts that comply with requirements specified below and the lighting fixture schedule on the Drawings.
  - 1. Conform to UL 935 - *Fluorescent Lamp Ballasts*.
  - 2. High power factor, at least 0.90.
  - 3. Class P, sound rated "A".
- B. For general fluorescent lighting in heated interior spaces (maintained above 50°F) provide solid-state, full-light-output type, electronic fluorescent ballasts with the following additional characteristics:
  - 1. Total line current harmonic distortion less than 15 percent.
  - 2. Meet ANSI C62.41 - *Guide for Surge Voltages in Low-Voltage AC Power Circuits*, Category A for resistance to normal and common mode transient voltage surges.
  - 3. Meet FCC Regulations Part 18, Class A for electromagnetic interference.
  - 4. Minimum operating frequency 20,000 Hz.
  - 5. Lamp current crest factor less than 1.7.
  - 6. Ballast Factor over 0.850.
  - 7. Contain no PCB's.
  - 8. Manufacturers: Advance, MagneTek, Motorola
- C. Provide low temperature fluorescent ballasts for fixtures installed in spaces maintained at less than 50°F.
- D. For dimmer controlled fluorescent lighting in heated interior spaces (maintained above 50°F) provide solid-state, controllable electronic fluorescent ballasts with the following additional characteristics:
  - 1. Total line current harmonic distortion less than 15 percent throughout the dimming range.
  - 2. Meet ANSI C62.41 - *Guide for Surge Voltages in Low-Voltage AC Power Circuits*, Category A for resistance to normal and common mode transient voltage surges.
  - 3. Meet FCC Regulations Part 18, Class A for electromagnetic interference.
  - 4. Minimum operating frequency 20,000 Hz.

5. Lamp current crest factor less than 1.7.
6. Ballast Factor over 0.850.
7. Contain no PCB's.
8. Continuous dimming from 100 percent to 20 percent.
9. Manufacturer: Advance

## 2.4 HIGH INTENSITY DISCHARGE LAMP BALLASTS

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**NOTE: Edit 2.4 to match project requirements.**

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- A. Provide high intensity discharge ballasts that comply with requirements specified below for lamps specified in this Section and the lighting fixture schedule on the Drawings:
  1. Conform to UL 1029 - *High-Intensity-Discharge Lamp Ballasts* and ANSI C82.4 - *Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps*.
  2. Constant wattage auto-transformer (CWA) or regulator, high-power-factor type.
  3. Minimum starting temperature of -30C.
  4. Normal ambient operating temperature 40C.
  5. Open circuit operation will not reduce normal ballast life.
  6. High pressure sodium (HPS) ballasts shall incorporate a solid-state ignitor/starter with an average life in the pulsing mode of 4,000 hours at an ignitor/starter case temperature of 90°C.
  7. When scheduled on the Drawings, provide high pressure sodium ballasts for 150 watt and smaller lamps with an instant restrike starter that will generate a multiple pulse to restrike lamp arc after a momentary power interruption.
  8. When scheduled on the Drawings, provide encapsulated high intensity discharge lamp ballasts for audible noise suppression.
- B. Manufacturers: Advance, MagneTek

## 2.5 FIXTURE ACCESSORIES

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**NOTE: Edit 2.5 to match project requirements.**

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- A. Furnish hangers for fixtures as specified below and indicated on the Drawings:
  1. Provide single stem hangers made of 1/2 inch steel tubing with swivel ball hanger fitting and ceiling canopy. Finish shall be the same as the fixture.
  2. Provide twin stem hangers made with dual 1/2 inch steel tubes and ceiling canopy to mount a single fixture. Finish shall be the same as the fixture.
  3. Provide rod hangers made of 1/4 inch threaded steel rod with electro-plated zinc finish.

4. Provide hook hangers that are integrated assemblies matched to the fixture and line voltage; equip with threaded attachment, power cord and locking type plug.
- B. Provide T-bar safety clips for lay-in fluorescent fixtures.
- C. Provide stud supports, mounting brackets, frames, plaster rings and other accessories required for fixture installation.

## PART 3 EXECUTION

### 3.1 INSTALLATION

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**NOTE: Edit 3.1 to match project requirements.**

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- A. Install fixtures in accordance with manufacturer's instructions and approved shop drawings.
- B. Locations of fixtures shown on the Drawings are diagrammatic. Coordinate fixture locations with building finishes, building structure, mechanical piping and ductwork, and automatic sprinkler system.
- C. Set fixtures plumb, square, level and aligned with walls unless otherwise indicated on the Drawings.
- D. Where the ceiling forms the protective membrane of a fire resistive assembly, install protective coverings over light fixtures in accordance with UL requirements.
- E. Do not support fixtures by ceiling acoustical panels or by dry-wall ceiling or wall panels.
- F. Where fixtures are supported from a suspended ceiling support system, install not less than four support rods or wires per fixture. Locate support rods or wires not more than six inches from fixture corners,
- G. Install surface mounted fixture directly to an outlet box which is supported from structure or suspended ceiling support system.
- H. Install stem-mounted fixture directly to an outlet box equipped with a fixture stud which is supported from structure or suspended ceiling support system. Support stem-mounted single-unit fluorescent fixture with twin-stem hanger. For continuous rows, use a single stem hanger for each length of fixture chassis, including one at each end.
- I. Brace pendants and rods that are 4 feet and longer to limit swinging.
- J. Mount recessed incandescent, compact fluorescent and HID fixture with at least two 3/4 inch support rails attached to suspended ceiling support system.
- K. Install lay-in fixtures using the T-bar grid flanges for support. Fasten fixtures to ceiling grid using T-bar safety clips.
- L. Connect fixtures in suspended ceilings using 6 ft. lengths of flexible metal conduit.
- M. Ground fixtures and ballasts in accordance with manufacturer's instructions and NFPA 70 requirements.
- N. Install lamps in fixtures in accordance with manufacturer's instructions.

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**NOTE: Use paragraph O for renovation projects.**

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- O. When replacing existing lighting system, replacement fixtures must be identical in size and installed in the exact same physical location. If replacement fixtures are of different dimensions or are to be installed in different locations, coordinate installation with LANL Fire Protection.

### 3.2 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Test installed fixtures for proper operation. Provide instruments to make and record test results. Replace or repair malfunctioning fixtures and components then re-test. Repeat procedure until all fixtures operate properly.
- C. Replace inoperative lamps.

### 3.3 ADJUSTING AND CLEANING

- A. Clean each fixture inside and out, including plastics and glassware. Use methods and materials recommended by manufacturer.
- B. Adjust fixture trim to fit adjacent surface.

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**NOTE: Edit paragraph C to match project requirements.**

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- C. Aim adjustable fixtures to illuminate intended areas as indicated on the Drawings or as directed by the Contract Administrator.

END OF SECTION

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**NOTE TO DESIGNER:** The lighting fixture schedule on the Drawings should contain the following information:

1. Fixture type designation (e.g. "A").
2. Description of fixture (e.g. "2'x4' four lamp lay-in fluorescent troffer with hinge and latch flush steel door").
3. Description of finish (e.g. "Baked white enamel finish").
4. Description of lens or louver (e.g. "Prismatic K-12 pattern acrylic lens").
5. Description of ballast if applicable (e.g. "277V electronic ballast").
6. Description and quantity of lamps (e.g. "4-F32T8/835 lamps").
7. Manufacturer and catalog number (e.g. "XYZ #123456-7890").

**Minimize the number of lamp and ballast types on each project.**

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